

09/735009

C r/c



PATENT  
24-BR-6010

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No.: 6,862,330 B2

Issued: March 1, 2005

Inventor(s): Boardman et al.

Assignee: General Electric Company

For: SYSTEMS AND METHODS OF  
PRODUCING HYDROGEN USING A  
NUCLEAR REACTOR

Certificate  
SEP 20 2007  
of Correction

CERTIFICATE OF MAILING

I certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on September 12, 2007.

Michael Tersillo  
Reg. No. 42,180

Attention Certificate of Corrections Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION OF  
PATENT UNDER 37 C.F.R. 1.322(a)

Sir:

Attached is Form PTO/SB/44 suitable for printing.

Submitted herewith is a copy of the Notice of Allowance and Fee(s) Due and the Notice of Allowability dated August 4, 2004 and a copy of the Amendment After Final Office Action filed July 9, 2004. Applicants respectfully submit that the corrections shown below are in accordance with the Amendment After Final Office Action filed July 9, 2004. The corrections thereof do not involve such changes in the patent as would constitute new matter or would require re-examination. Applicants respectfully request a Certificate of Correction for the following:

In Claim 1, column 4, line 38, delete "loop arid said" and insert therefor -- loop and said --.

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In Claim 3, column 4, line 59, delete "about 500°C" and insert therefor -- about 550°C --.

In Claim 12, column 5, line 37, between "used" and "power" insert -- to --.

In Claim 14, column 5, line 55, delete "about 500°C" and insert therefor -- about 550°C --.

In Claim 18, column 6, line 19, delete "heat exchange" and insert therefor -- heat exchanger --.

The corrections are not due to any error by Applicants and no fee is due.

The Assignment for this patent is recorded on Reel 011375/Frame 0278.

Date: \_\_\_\_\_

9/12/07

Respectfully submitted,



Michael Tersillo  
Reg. No. 42,180  
ARMSTRONG TEASDALE LLP  
One Metropolitan Square, Suite 2600  
St. Louis, Missouri 63102-2740  
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SEP 20 2007

## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO. : 6,862,330 B2  
APPLICATION NO. : 09/735,009  
ISSUE DATE : March 1, 2005  
INVENTOR(S) : Boardman et al.

PAGE 1 OF 1

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Claim 1, column 4, line 38, delete "loop arid said" and insert therefor -- loop and said --.

In Claim 3, column 4, line 59, delete "about 500°C" and insert therefor -- about 550°C --.

In Claim 12, column 5, line 37, between "used" and "power" insert -- to --.

In Claim 14, column 5, line 55, delete "about 500°C" and insert therefor -- about 550°C --.

In Claim 18, column 6, line 19, delete "heat exchange" and insert therefor -- heat exchanger

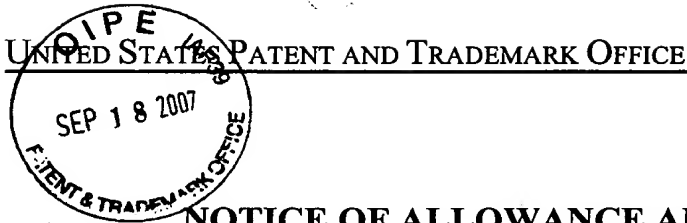
--.

MAILING ADDRESS OF SENDER:

Michael Tersillo  
Armstrong Teasdale LLP  
One Metropolitan Sq., Suite 2600  
St. Louis, MO 63102

SEP 20 2007

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



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Alexandria, Virginia 22313-1450  
www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

7590

08/04/2004

John S. Beulick  
-Armstrong Teasdale LLP  
Suite 2600  
One Metropolitan Square  
St. Louis, MO 63102-2740

EXAMINER

PALABRICA, RICARDO J

ART UNIT

PAPER NUMBER

3641

DATE MAILED: 08/04/2004

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/735,009

12/12/2000

Charles E. Boardman

24-BR-6010

3389

TITLE OF INVENTION: SYSTEMS AND METHODS OF PRODUCING HYDROGEN USING A NUCLEAR REACTOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	11/04/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

### HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 07/04) Approved for use through 04/30/2007.

Entered into PIPs  
Date: 03-09-2005  
By: [Signature]  
Page 1 of 3

ENTERED  
Date: 8/17/04  
By: [Signature]  
12551-165  
SEP 20 2007



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## Notice of Allowability

Application No.

09/735,009

Examiner

Rick Palabrica

Applicant(s)

BOARDMAN ET AL.

Art Unit

3641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

If claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

☒ This communication is responsive to 7/9/04 Amendment After Final Action.

☒ The allowed claim(s) is/are 1-13 and 25-35.

☒ The drawings filed on 9/28/01 are accepted by the Examiner.

☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some\* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

(a) ☐ including changes required by the Notice of Draftperson's Patent Drawing Review (PTO-948) attached

1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.

(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

### Attachment(s)

☐ Notice of References Cited (PTO-892)

☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_

☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_

7. ☐ Examiner's Amendment/Comment

8. ☐ Examiner's Statement of Reasons for Allowance

9. ☐ Other \_\_\_\_\_

JACK KEITH  
PRIMARY EXAMINER

SEP 20 2007

COPY



THE UNITED STATES PATENT OFFICE IS REQUESTED TO  
IMPRESS ITS STAMP ON THIS CARD AND PLACE SAME IN THE  
OUTGOING MAIL TO SHOW THE FOLLOWING PAPERS HAVE BEEN  
RECEIVED.

Atty Dkt. No.: 24-BR-6010 (12551-00165)  
Application of: Boardman et al.  
Serial No. 09/735,009  
Filed: December 12, 2000  
Group No. 3641  
Examiner: R. Palabrica  
For: SYSTEM AND METHODS OF PRODUCING HYDROGEN USING A  
NUCLEAR REACTOR

Enclosed:

Amendment After Final Office Action (37 C.F.R. § 1.116), (10 pgs.), in response to Office  
Action dated May 5, 2004, and made final  
Amendment Transmittal Form (3 pgs.), in duplicate

Express Mail Label No. EV335793811US  
MT:ls  
Mailed: July 9, 2004

EV335793811US

SEP 20 2007



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Boardman et al.

Serial No.: 09/735,009

Filed: December 12, 2000

For: SYSTEM AND METHODS OF  
PRODUCING HYDROGEN USING A  
NUCLEAR REACTOR

Art Unit: 3641

Examiner: R. Palabrica

COPY

Commissioner for Patents  
Mail Stop AF  
P.O. Box 1450  
Alexandria, VA 22313-1450

TRANSMITTAL

- Transmitted herewith is:  
Amendment After Final Office Action (37 C.F.R. § 1.116 (10 pgs.), in response to  
Office Action dated May 5, 2004 and made final  
Amendment Transmittal Form (3 pgs.), in duplicate

STATUS


- Applicant  
☐ claims small entity status.  
☒ is other than a small entity.

CERTIFICATE OF MAILING BY EXPRESS MAIL TO  
THE COMMISSIONER FOR PATENTS

Express Mail No. EV335793811US

Date: July 9, 2004

I hereby certify that the documents listed above are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

  
Michael Tersillo, Reg. No. 42,180

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## EXTENSION OF TERM

3. The proceedings herein are for a patent application and the provisions of 37 C.F.R. 1.136 apply.

(complete (a) or (b), as applicable)

- (a) ☐ Applicant petitions for an extension of time under 37 C.F.R. 1.136  
(Fees: 37 C.F.R. 1.17(a)-(d) for the total number of months checked below:)

Extension for response within:	Other than small entity Fee	Small entity Fee (if applicable)
<input type="checkbox"/> first month	\$ 110.00	\$ 55.00
<input type="checkbox"/> second month	\$ 420.00	\$ 210.00
<input type="checkbox"/> third month	\$ 950.00	\$ 475.00
<input type="checkbox"/> fourth month	\$1,480.00	\$ 740.00
<input type="checkbox"/> fifth month	\$2,010.00	\$1,005.00
	Fee Due	\$ _____

If an additional extension of time is required, please consider this a petition therefor.

(Check and complete the next item, if applicable)

- ☐ An extension of \_\_\_\_\_ months has already been secured. The fee paid therefor \$\_\_\_\_\_ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request \$ \_\_\_\_\_.

**OR**

- (b) ☒ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.



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## FEE FOR CLAIMS

4. The fee for claims (37 C.F.R. 1.16(b)-(d)) has been calculated as shown below:

	(Col. 1)		(Col. 2)	(Col. 3)	SMALL ENTITY		OTHER THAN SMALL ENTITY
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	ADDITIONAL RATE FEE	OR	ADDITIONAL RATE FEE
TOTAL		MINUS		=	x \$9 = \$		x \$18 = \$
INDEP.		MINUS		=	x \$43 = \$		x \$86 = \$
FIRST PRESENTATION OF MULTIPLE DEP. CLAIM					+ \$145 = \$		+ \$290 = \$
					TOTAL ADDITIONAL FEE \$	OR	TOTAL ADDITIONAL FEE \$

(a) ☒ No additional fee for Claims is required

OR

(b) ☐ Total additional fee for claims required \$

## FEE PAYMENT

5. Attached is a check in the sum of \$

☐ Charge Deposit Account No. 01-2384 the sum of \$  
A duplicate of this transmittal is attached.

## FEE DEFICIENCY

6. ☒ If any additional extension and/or fee is required, charge Deposit Account No. 01-2384.

AND/OR

☒ If any additional fee for claims is required, charge Deposit Account No. 01-2384.

7. ☐ Other:



Michael Tersillo  
Reg. No. 42,180  
ARMSTRONG TEASDALE LLP  
One Metropolitan Square, Suite 2600  
St. Louis, MO 63102  
314/621-5070

24-BR-6010  
PATENT

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IN THE CLAIMS

Please cancel Claims 14-24.

1. (currently amended) A system for generating hydrogen comprising:

feed water;

a liquid metal nuclear reactor having a non-radioactive secondary heat loop comprising a recirculated heat transfer medium;

a steam generator connected to said secondary heat loop, said heat transfer medium and said feed water passing through said steam generator, said steam generator capable of raising the temperature of said feed water;

a high temperature water cracking system, said feed water coupled to said water cracking system by a feed water input line, said secondary heat loop and said recirculated heat transfer medium being separate from said high temperature water cracking system; and

a topping heater, said topping heater capable of raising the temperature of said feed water so that said feed water in said high temperature water cracking system is at least about 850°C, said feed water input line coupled in flow communication with said steam generator, said topping heater, and said high temperature water cracking system, said feed water disassociated into hydrogen and oxygen in said high temperature water cracking system, said high temperature water cracking system being separate from all any secondary heat ~~loops~~ loop of said liquid metal nuclear reactor.

2. (original) A system in accordance with Claim 1 wherein said feed water comprises output from at least one of a desalination plant, a water clean-up system, and a steam turbine condenser.

3. (original) A system in accordance with Claim 1 wherein said water feed input line is coupled to said steam generator, said steam generator raises the temperature of said feed water to between about 450°C to about 550°C.

4. (original) A system in accordance with Claim 3 wherein said feed water is coupled to said topping heater downstream from said steam generator, said topping heater raises the temperature of said feed water to at least 850°C

5. (original) A system in accordance with Claim 1 wherein said topping heater comprises a gas fired heater.

6. (previously presented) A system in accordance with Claim 5 further comprising a topping heater fuel, said topping heater fuel comprises a portion of said oxygen and hydrogen disassociated from said feed water in said high temperature water cracking system.

7. (previously presented) A system in accordance with Claim 5 further comprising a first regenerative heat exchanger and a topping heater exhaust line, said exhaust line coupled to said first regenerative heat exchanger to direct exhaust from said gas fired topping heater into said first regenerative heat exchanger, said feed water input line coupled to said first regenerative heat exchanger downstream of said steam generator.

8. (previously presented) A system in accordance with Claim 7 further comprising a first regenerative heat exchanger exhaust line, said first regenerative heat exchanger exhaust line coupled to a desalination plant to direct exhaust from said gas fired topping heater to said desalination plant after passing through said first regenerative heat exchanger.

9. (previously presented) A system in accordance with Claim 7 further comprising a second regenerative heat exchanger and a first regenerative heat exchanger exhaust line, said first regenerative heat exchanger exhaust line coupled to said second regenerative heat exchanger to direct exhaust from said gas fired topping heater to said second regenerative heat exchanger after passing through said first regenerative heat exchanger.

10. (previously presented) A system in accordance with Claim 9 further comprising a steam turbine and generator assembly, and a steam line, said steam line extending from said steam generator through said second regenerative heat exchanger to said steam turbine to direct a portion of an output of said steam generator through said second regenerative heat exchanger and to said steam turbine and generator assembly.

11. (previously presented) A system in accordance with Claim 1 further comprising a steam turbine and generator assembly, and a steam line, said steam line extending from said steam generator to said steam turbine to direct a portion of an output of said steam generator to said steam turbine and generator assembly to generate electricity.

12. (withdrawn) A system in accordance with Claim 11 wherein said topping heater comprises an electric heater, and a portion of said electricity generated by said steam turbine and generator assembly is used to power said electric topping heater.

13. (withdrawn) A system in accordance with Claim 1 further comprising an electricity producing fuel cell facility, and said topping heater comprises an electric heater, a portion of hydrogen and oxygen produced by said high temperature water cracking system is used as fuel in said electricity producing fuel cell, a portion of electricity produced by said fuel cell facility is used to power said electric topping heater, and water produced by said fuel cell facility is used as an addition to said feed water for said high temperature water cracking system.

14 - 24. (canceled)

25. (currently amended) A system for generating hydrogen comprising:

feed water;

a liquid metal nuclear reactor having a non-radioactive secondary heat loop comprising a recirculated heat transfer medium;

a steam generator connected to said secondary heat loop, said heat transfer medium and said feed water passing through said steam generator, said steam generator capable of raising the temperature of said feed water to between about 450°C to about 550°C;

a high temperature water cracking system, said feed water coupled to said water cracking system by a feed water input line, said secondary heat loop and said recirculated heat transfer medium being separate from said high temperature water cracking system; and

a topping heater, said topping heater capable of raising the temperature of said feed water so that said feed water in said high temperature water cracking system is at least about 850°C, said feed water input line coupled in flow communication with said steam generator, said topping heater, and said high temperature water cracking system, said feed water disassociated into hydrogen and oxygen in said high temperature water cracking system, said high temperature water cracking system being separate from ~~all~~ any secondary heat ~~loops~~ loop of said liquid metal nuclear reactor.

26. (original) A system in accordance with Claim 25 wherein said feed water comprises output from at least one of a desalination plant, a water clean-up system, and a steam turbine condenser.

27. (original) A system in accordance with Claim 25 wherein said topping heater comprises a gas fired heater.

28. (previously presented) A system in accordance with Claim 27 further comprising a topping heater fuel, said topping heater fuel comprises a portion of said oxygen and hydrogen disassociated from said feed water in said high temperature water cracking system.

29. (previously presented) A system in accordance with Claim 27 further comprising a first regenerative heat exchanger and a topping heater exhaust line, said exhaust line coupled to said first regenerative heat exchanger to direct exhaust from said gas fired topping heater into said first regenerative heat exchanger, said feed water input line coupled to said first regenerative heat exchanger downstream of said steam generator.

30. (previously presented) A system in accordance with Claim 29 further comprising a first regenerative heat exchanger exhaust line, said first regenerative heat exchanger exhaust line coupled to a desalination plant to direct exhaust from said gas fired topping heater said desalination plant after passing through said first regenerative heat exchanger.

31. (previously presented) A system in accordance with Claim 29 further comprising a second regenerative heat exchanger and a first regenerative heat exchanger exhaust line, said first regenerative heat exchanger exhaust line coupled to said second regenerative heat exchanger to direct exhaust from said gas fired topping heater to said second regenerative heat exchanger after passing through said first regenerative heat exchanger.

32. (previously presented) A system in accordance with Claim 31 further comprising a steam turbine and generator assembly, and a steam line, said steam line extending from said steam generator through said second regenerative heat exchanger to said steam turbine to direct a portion of an output of said steam generator through said second regenerative heat exchanger and to said steam turbine and generator assembly.

33. (previously presented) A system in accordance with Claim 25 further comprising a steam turbine and generator assembly, and a steam line, said steam line extending from said steam generator to said steam turbine to direct a portion of an output of said steam generator to said steam turbine and generator assembly to generate electricity.

34. (withdrawn) A system in accordance with Claim 33 wherein said topping heater comprises an electric heater, and a portion of said electricity generated by said steam turbine and generator assembly is used to power said electric topping heater.

35. (withdrawn) A system in accordance with Claim 25 further comprising an electricity producing fuel cell facility, and said topping heater comprises an electric heater, a portion of hydrogen and oxygen produced by said high temperature water cracking system is used as fuel in said electricity producing fuel cell, a portion of electricity produced by said fuel

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cell facility is used to power said electric topping heater, and water produced by said fuel cell facility is used as an addition to said feed water for said high temperature water cracking system.

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Remarks

The Office Action dated May 10, 2004 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-13, and 25-35 are pending in this application. Claims 1-11 and 25-33 stand rejected. Claims 12-24 and 34-35 are withdrawn from consideration. Claims 14-24 have been canceled.

Applicants respectfully submit that contrary to the suggestion at page 2 of the Office Action, the recitation "said topping heater capable of raising the temperature of said feed water so that said feed water in said high temperature water cracking system is at least about 850°C" is a structural imitation and not an intended use of the system. Applicants submit that the topping heater has to be structurally sized to raise the temperature of the feed water to 850°C. Applicants further submit that there is no teaching in Kapich that the heat exchanger taught in his system is capable of raising the temperature of the feed water to 850°C. Rather Kapich teaches a temperature of 760°C.

The rejection of Claims 1-11 and 25-33 under 35 U.S.C. § 112, first paragraph, is respectfully traversed.

Claims 1 and 25 have been amended to recite "said high temperature water cracking system being separate from any secondary heat loop of said liquid metal nuclear reactor". Applicants submit that the recitation does not contain new subject matter. Particularly, originally filed Claim 1 recited "A system for generating hydrogen comprising: . . . a liquid metal reactor having a non-radioactive secondary heat loop". Applicants respectfully submit that the term "comprising" is open ended and as such the liquid metal reactor is not limited to only one

secondary heat loop. Other secondary heat loops can be present because of the open-ended structure of Claim 1. Therefore, any implication of more than one secondary heat loop has been disclosed in the originally filed application.

Further, Applicants submit that multiple secondary heat loops are known in the art, see U.S. Patent No. 4,413,348 to Kapich, and one skilled in the art would know how to make and use a liquid metal reactor having multiple secondary heat loops. The Federal Circuit has opined in *Verve LLC v. Crane Cams, Inc.*, 65 USPQ 2d 1051, 1053-1054 (Fed. Cir. 2002), that "[p]atent documents are written for persons familiar with the relevant field; the patentee is not required to include in the specification information readily understood by practitioners, lest every patent be written as a comprehensive tutorial and treatise for the generalist, instead of a concise statement for persons in the field." Accordingly, Applicants submit that Claims 1-11 and 25-33 meet the requirements of Section 112, first paragraph.

For the reasons set forth above, Applicants respectfully request that the Section 112, first paragraph, rejection of Claims 1-11 and 25-33 be withdrawn.

The rejection of Claims 1-11 and 25-33 under 35 U.S.C. § second paragraph, is respectfully traversed.

At least for the reasons set forth above, Applicants submit that Claims 1-11 and 25-33 are definite and particularly point out and distinctly claim the subject matter which Applicants regard as their invention.

For the reasons set forth above, Applicants respectfully request that the Section 112, second paragraph, rejection of Claims 1-11 and 25-33 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Favorable action is respectfully solicited.

Respectfully submitted,



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